

**WAIAWA BRIDGE  
(Waiawa Bridge Westbound)  
Kamehameha Highway westbound and Waiawa Stream  
Pearl City Vicinity  
Honolulu County  
Hawaii**

**HAER No. HI-101**

**PHOTOGRAPHS**

**WRITTEN HISTORICAL AND DESCRIPTIVE DATA**

**HISTORIC AMERICAN ENGINEERING RECORD  
U.S. Department of the Interior  
National Park Service  
Oakland, California**

# HISTORIC AMERICAN ENGINEERING RECORD

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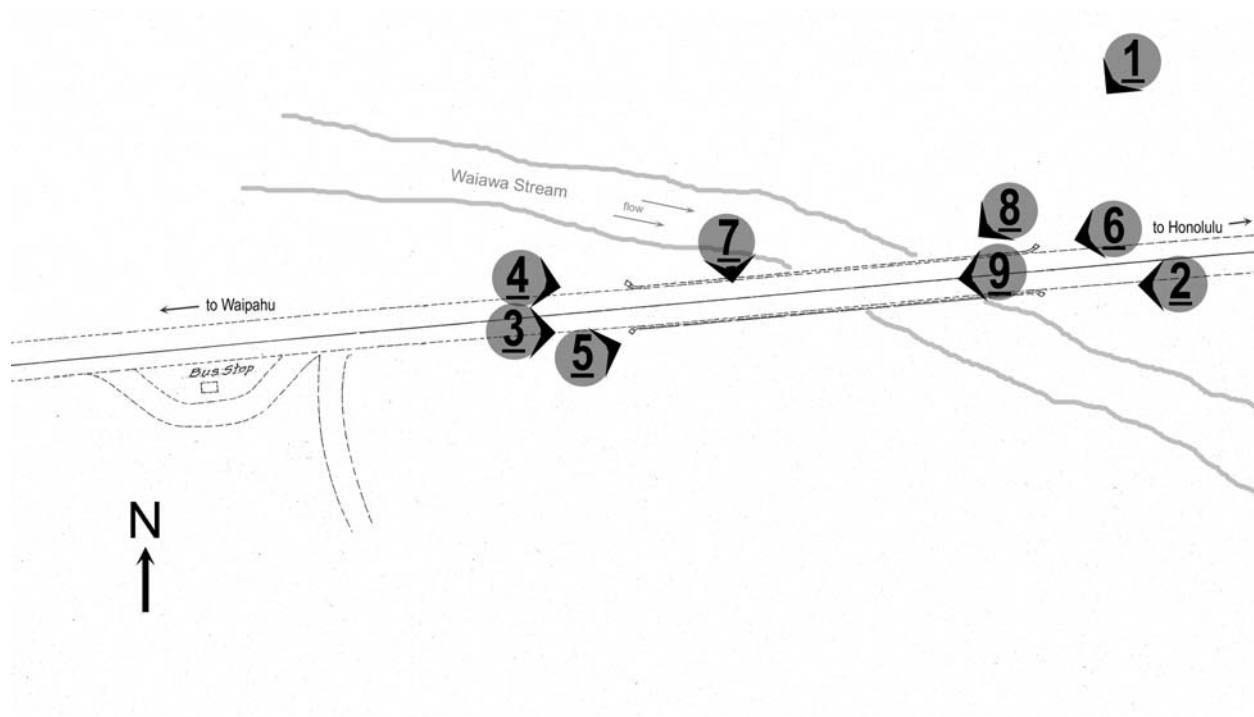
David Franzen, Photographer

May 2012

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PHOTO KEY



## HISTORIC AMERICAN ENGINEERING RECORD

### WAIAWA BRIDGE (Waiawa Bridge Westbound)

HAER No. HI-101

- Location:** Kamehameha Highway westbound and Waiawa Stream  
Pearl City Vicinity  
City and County of Honolulu, Hawaii  
U.S.G.S. Topographic map, Waipahu Quadrangle 1998 (7.5 minute series)  
Universal Transverse Mercator Coordinates NAD 83:  
04.605720.2366360
- Present Owner:** State of Hawaii
- Present Use:** Vehicular Bridge
- Significance:** The Waiawa Bridge is significant for its contribution to the development of an effective road transportation network on Oahu, as part of the Kamehameha Highway section of Oahu's belt road system. This bridge is the earliest one remaining in the area formerly known as Ewa Junction. This was a significant transportation intersection, where the original government road system had diverging alignments. The main belt road (Kamehameha Highway) led from the junction either east to Honolulu or north to Schofield Barracks then around the North Shore to the windward side; the other section of government road (Waianae Road, later Farrington Highway) started at the junction and traveled west to the southwest plains and then north up western coastline of Oahu. Waiawa Bridge is also significant as one of Hawaii's longest tee-beam bridges, with distinctive 54' spans, which are unusually long for this type.
- Historian:** Dee Ruzicka  
Mason Architects, Inc.  
119 Merchant Street, Suite 501  
Honolulu, HI 96813
- Project Information:** This report is part of the documentation for properties identified as adversely affected by the Honolulu Rail Transit Project (H RTP) in the City and County of Honolulu. This documentation was required under Stipulation V.C. (1, 2) of the Honolulu High-Capacity Transit Corridor Project (HHCTCP) Programmatic Agreement (PA), which was signed by the U.S. Department of Transportation's Federal Transit Administration, the Hawaii State Historic Preservation Officer, the United States Navy, and the Advisory Council on Historic Preservation. After consultation with the City and County of Honolulu, the National Park Service, Pacific West Regional Office, in a letter dated June 29, 2011, stipulated the details of the required documentation efforts, including HAER documentation for this and other bridges affected by the H RTP. Archival photographs were taken by David Franzen, Franzen Photography, Kailua, HI. The field work was conducted in May 2012 and the initial report prepared in June 2012. The report was finalized in December 2012.

## Part I. Historical Information:

### A. Physical History:

1. **Date of construction:** 1933<sup>1</sup>
2. **Engineer:** Merritt A. Trease is noted as the "design engineer" for this bridge in Thompson's inventory of Oahu bridges.<sup>2</sup> The city directories of the early 1930s list Trease as a draftsman, rather than as an engineer,<sup>3</sup> but he progressed steadily in his career. Louis S. Cain, Superintendent of Public Works for the Territory of Hawaii, had recruited him in 1926; by 1964, when Trease retired, he was head planning engineer of the Highways Division for the State of Hawaii, Department of Transportation (DOT).<sup>4</sup>
3. **Builder/ Contractor/ Supplier:** J. L. Young Engineering Co. was the contractor for this bridge.<sup>5</sup>
4. **Original plans and construction:** Original drawings of the bridge were provided by the State of Hawaii DOT, and one is reproduced in this report. The Waiawa Bridge is listed in the National Bridge Inventory Database as a concrete tee-beam bridge, with the Structure Number 003000990401802.
5. **Alterations and additions:** Steel guardrails were added at each side of the eastern approach to the bridge. On the northeast corner, the guardrail is attached to the curving section of the parapet, and on the southeast corner, the guardrail is attached to the southeast stanchion. They were evidently installed in the 1950s or later, after an additional two-lane road section and bridge was added to Kamehameha Highway and this 1933 bridge was converted to one-way traffic. The plainer southeast stanchion (see Description section) appears to be a replacement, since it does not match the design of the other three.

### B. Historical Context:

For historical information on other 1930s bridges along Farrington Highway and Kamehameha Highway, see the Historic American Engineering Record (HAER) reports, or the National Register of Historic Places (NRHP) forms, for the following (HAER numbers noted): Waikele Canal Bridge and Highway Overpass (HAER No. HI-100), Waimalu Bridge (HAER No. HI-115), Kalauao Springs Bridge (HAER No. HI-116), and Kalauao Stream Bridge (HAER No. HI-117). For information on the development of the Waipahu area see the HAER report or NRHP form for the Waikele Canal Bridge and Highway Overpass.

Before the 1933 Waiawa Bridge was built, this part of Kamehameha Highway followed a curving path down into and out of Waiawa gulch. The earlier highway alignment crossed Waiawa

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<sup>1</sup> National Bridge Inventory Database, Waiawa Bridge, on website [nationalbridges.com](http://nationalbridges.com), accessed May 23, 2012.

<sup>2</sup> Bethany Thompson, Historic Bridge Inventory, Island of Oahu (Prepared for the State of Hawaii, Department of Transportation, Highways Division) 1983. p. VII-129.

<sup>3</sup> Polk-Husted Directory Co., *Directory of the City and County of Honolulu and the Territory of Hawaii*, Vols. 1931-32 through 1934-35 (Honolulu: Author) 1931-1934. Various pages.

<sup>4</sup> "Trease: A Roadmap in His Head," *Honolulu Advertiser*, July 12, 1964, article at the University of Hawaii, Hamilton Library, Honolulu Newspapers Clippings Morgue, on microfiche in Biographical section under: Trease, Merritt and Esther.

<sup>5</sup> Superintendent of Public Works, *Report to the Governor, Territory of Hawaii, for the Year Ending June 30, 1933* (Honolulu: Advertiser Publishing Co., Ltd.) 1934. p. 15.

Stream on a short bridge that was located to the south of the current one. The surrounding land use, up until World War II was entirely agricultural, either sugarcane or pineapple plantations. During World War II land to the north and east of this bridge was developed as Navy storage areas.

Starting in the mid-nineteenth century, the successive Kingdom, Provisional Government, Republic, and Territory of Hawaii leaders always had the goal of an improved road system, especially a "belt road" around each island. However, they constantly faced the challenge of building this infrastructure within the financial constraints of their budgets. Once funds from the federal government became available, after 1925, to assist in the financing of Hawaii's roads and bridges, the belt roads on the main islands were completed and further roadway improvements continued.

After Hawaii became a U.S. Territory at the turn of the twentieth century, it expected to become a state eventually, and to share in federal appropriations. Hawaii was like Alaska and other former territories on the North American continent. Hawaii was not a "possession" like the islands obtained as a result of the Spanish-American war (Puerto Rico, Guam, and the Philippines), which were not considered as potential states. However, it took a long time to obtain the funding from Congress to which Hawaii was entitled. There were various reasons for the delay, including the fact that Hawaii had no voting member in Congress. When federal money was first authorized for Hawaii roads in 1925, it was restricted to the ones linking military installations and National Park units to ports.<sup>6</sup>

Mainland states had been receiving Federal highway funds since 1917, while Hawaii received none until 1925. The Federal government provided a portion of those "lost" funds to Hawaii in 1931 with a "special appropriation amounting to \$880,000 ... as the amount of Federal Aid that the Territory would have earned during the period 1917-1925."<sup>7</sup> The Waiawa Bridge was constructed with these "Emergency Highway" funds; thus, it was designated Federal Aid Project (FAP) E-9-B, with the E denoting the special funding (although sometimes the E is dropped from the FAP number).<sup>8</sup>

As noted by the Superintendent of Public Works in his report for 1933, for the "Federal Aid Emergency Projects, all funds ... had to be expended within a certain period."<sup>9</sup> The Waiawa bridge and seven other road projects were accomplished within a year or two (deadline of June 30, 1933 to spend or obligate funds), which was a tremendous burst of transportation improvements for the Territory. This was achieved with dedicated public employees and contracting firms.

This 1933 bridge was built on a section of road that re-routed Kamehameha Highway from its earlier alignment, which had curved south into Waiawa gulch. The section of highway carried by the 1933 Waiawa Bridge eliminated this bend, which had been the most prominent curve in the highway along the stretch between Ewa Junction and Pearl City Junction. That arc in the earlier roadway routing carried the highway down and up the sides of Waiawa gulch, in order to cross Waiawa Stream with a relatively short and inexpensive bridge. By the early 1930s technological developments and federal funding assistance allowed this long (approximately 330') 1933 Waiawa Bridge to cross the gulch in a straighter alignment.

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<sup>6</sup> Thomas S. MacDonald, "Highway Administration in the United States," *Good Roads*, Nov. 1925. pp. 275-277.

<sup>7</sup> Superintendent of Public Works, *Report to the Governor, Territory of Hawaii, for the Year Ending June 30, 1932* (Honolulu: Advertiser Publishing Co., Ltd.) 1933. p. 21.

<sup>8</sup> *Ibid.*, pp. 26 & 34.

<sup>9</sup> Superintendent of Public Works, *Report to the Governor, Territory of Hawaii, for the Year Ending June 30, 1933* (Honolulu: Advertiser Publishing Co., Ltd.) 1934. p. 8.

Another road improvement in the area, made several years later, ca. 1940, was the section of highway constructed just north of this bridge. This section, called the Waiawa Cutoff,<sup>10</sup> branched off Kamehameha Highway just east of the Waiawa Bridge. It curved east and north and rejoined Kamehameha Highway just north of Ewa Junction, thereby allowing traffic between Wahiawa and Pearl City to bypass Ewa Junction.

At the time of the Waiawa Bridge's construction, it carried Kamehameha Highway traffic in both directions, one lane eastbound (from Ewa Junction) and one lane westbound (to Ewa Junction). This traffic pattern on Waiawa Bridge, with one lane in each direction, lasted until ca. 1953 when another section of highway was built south of the Waiawa Bridge. (The ca. 1953 bridge siting across Waiawa Gulch was approximately above the location of the pre-1933 bridge on the curved section of the earlier highway alignment.) When this ca. 1953 project (two-lane bridge and highway section) was finished, it carried Kamehameha Highway's eastbound traffic, while the two lanes of the 1933 Waiawa Bridge carried the westbound traffic. In conjunction with this ca. 1953 construction, an overpass bridge was built crossing the highway just east of the Waiawa Bridge. This overpass allows eastbound traffic from Waiawa Cutoff to merge into Kamehameha Highway without having to stop for an intersection.

This 1933 Waiawa Bridge is the oldest functioning roadway structure in the complex of bridges and overpasses surrounding the formerly simple intersection called Ewa Junction. Traffic in this vicinity increased tremendously during World War II, with the rapid development of numerous Navy installations nearby. These included Manana storehouses, a Construction Battalion housing area adjacent to those storehouses, Naval Aviation Supply Depot locations in Waiawa Valley and in Pearl City, the Naval Supply Depot's Fuel Annexes at Ewa Junction and at Pearl City Peninsula, plus several Navy activities on Waipio Peninsula. In 1970 the H-1 freeway overpasses and ramps added complexity to the road system in this area, which was further complicated when the H-2 freeway interchange was built later in the 1970s northwest of this bridge.

### **James L. Young, Engineer and Contractor**

The contractor who built this significant bridge had a long history of achievement in Hawaii, following his 1905 arrival here while in civil service with the U.S. Army Engineers and Quartermaster Department. He was born in Kentucky, educated there and in Ohio as both an architect and engineer. He worked on the mainland and in Cuba before coming to Hawaii. His first five years in Hawaii involved building Fort Shafter and inaugurating construction at Fort Ruger, Fort Kamehameha, and Schofield Barracks; in 1910 he started the Lord-Young Engineering Co., which later became J.L. Young Engineering Co.<sup>11</sup> He practiced in Hawaii for at least twenty-five years as a general contractor and consulting engineer. His extensive list of projects included: ordnance buildings on Magazine Island (now Kuahua Peninsula at Pearl Harbor), hangars on Ford Island, University of Hawaii (at Manoa) library and administration building (George Hall), five structures at Palama Settlement, Honolulu Star-Bulletin Building, Hawaii State Library, Pantheon Block, and Bishop Museum laboratory (Konia Hall). The last two were noted as the "first two reinforced concrete fireproof buildings in Hawaii."<sup>12</sup>

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<sup>10</sup> Territorial Highway Department, Hawaii Highway Planning Survey, Bridge Inventory for the Island of Oahu (Prepared in Cooperation with the U.S. Department of Commerce, Bureau of Public Roads) September 1950. Bridge Names (second map).

<sup>11</sup> George F. Nellist, *The Story of Hawaii and Its Builders, with which is Incorporated Volume III, Men of Hawaii* (Honolulu: Honolulu Star-Bulletin, Ltd.) 1925. p. 911.

<sup>12</sup> George F. Nellist, *Men of Hawaii, Volume IV* (Honolulu: Honolulu Star-Bulletin, Ltd.) 1930. pp. 591-593.

## Tee-Beam Bridges

For background history of the evolution of tee-beam bridges, see Waikele Canal Bridge and Highway Overpass, HAER No. HI-100. Tee-beam bridges are the most common remaining type of pre-World War II bridges in Hawaii,<sup>13</sup> and the average span length for this type bridge is 30'.<sup>14</sup> Tee-beam design was more economical than simpler flat slab construction for lengths of over about 25', but they were not as efficient as arch or truss bridge construction, due to their need for additional supporting bents in longer lengths.<sup>15</sup>

The individual span length of 54' for the Waiawa Bridge is notable for tee-beam bridges, and among the longest span length in Hawaii for this type. Due to this bridge's six spans, it has an overall length of approximately 330' that is also distinctive in Hawaii for tee-beam bridges.

## Pearl City

For additional history of Pearl City and particularly Pearl City Peninsula, see HAER No. HI-95, U.S. Naval Base Pearl Harbor, Carrier Moorings V1, V2, V3, & V4.

Pearl City was Oahu's first planned suburban development,<sup>16</sup> initiated by Benjamin F. Dillingham in 1890. Dillingham had started the Oahu Railway & Land Company railroad line the year before, and created Pearl City by subdividing his land on the (Pearl City) peninsula and further *mauka* (common Hawaiian term denoting: inland) in the area of Pearl City Junction at the intersection of Government Road (future Kamehameha Highway) and Lehua Avenue. The subdivided lots were sold at auction beginning in November 1890 at \$44 per lot. By 1892, about 250 lots out of 800 had been sold.<sup>17</sup>

Up until 1920, the area was still a small settlement, despite the "City" in its name. Starting in the 1910s, some military families joined the peninsula's original residents, especially those of non-commissioned officers, who often lived in rental units.<sup>18</sup> It was a popular location because they could commute to Ford Island and the main base at Pearl Harbor by small boat or ferry. Most of the Pearl City Hawaiian, Chinese, and Japanese families worked small small farming operations in taro, rice, bananas, and watercress. Another important occupation for these families was as domestic help for their neighboring, wealthier lot owners.<sup>19</sup> Affluent Caucasian families purchased most of the waterfront lots on Pearl City Peninsula and eventually put up weekend homes there, while maintaining primary residences in Honolulu.

During the 1920s and 1930s as automobiles became more common and roads were improved, the Pearl City area grew in population with residents who commuted to work in Honolulu. During World War II, all the Pearl City Peninsula (PCP) land was turned over to Navy control

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<sup>13</sup> Heritage Center, School of Architecture, University of Hawaii at Manoa, State of Hawaii, Historic Bridge Inventory and Evaluation (Draft prepared for State of Hawaii, Department of Transportation, Highways Division) 2008. p. I-72.

<sup>14</sup> Parsons Brinckerhoff and Engineering and Industrial Heritage, A Context for Historic Bridge Types, NCHRP Project 25-25, Task 15 (Prepared for the National Cooperative Highway Research Program) October 2005. p. 3-89

<sup>15</sup> Ibid., p. 3-88.

<sup>16</sup> Jim Chiddix and MacKinnon Simpson, *Next Stop Honolulu, Oahu Railway & Land Company 1889-1971* (Honolulu: Sugar Cane Press) 2004. p. 38.

<sup>17</sup> Ibid., p. 42.

<sup>18</sup> Ann Yoklavich, Historic American Buildings Survey (HABS), U.S. Naval Base, Pearl Harbor, Pearl City Peninsula, HABS No. HI-393 (Submitted to National Park Service, U.S. Department of the Interior) 2004. p. 3.

<sup>19</sup> Joyce Chinen, "The Suburbanization of Pearl City," *The Pearl City Local History Project* (Pearl City: Cultural Heritage Learning Center) 1994. p. 10.



and developed with a variety of facilities, few of which remain. The Navy condemned the PCP land after the war and redeveloped it, mostly with military housing.<sup>20</sup>

The growth trend in Pearl City, in areas adjacent to and *mauka* of the peninsula, continued after World War II with housing "sprout[ing] in former agricultural areas" and coming to displace much of the small farms and sugar cane land.<sup>21</sup> Along with this increase in housing, the establishment of businesses along Kamehameha Highway spurred additional community growth.

By the late 1950s, Pearl City's development mirrored the national pattern of suburban development, but was also "very unique" because of the period of martial law during the war, which had a "profound impact on the transformation of the Pearl City area."<sup>22</sup> This was due to the confiscation of land and other property that affected Japanese farmers in the area, divesting them of their homes and sources of income. This re-apportionment of Pearl City land, along with "the influx of new populations from the mainland, active duty and civilian defense workers, meant new residents and new services for the area, and set the stage for the post war development that followed."<sup>23</sup> The end of many farming operations and the displacement of former residents "created somewhat of a social vacuum in the area" and allowed much of the post-war development when several subdivisions were built *mauka* of Kamehameha Highway.<sup>24</sup> The fee-simple titles that were available for these lots were a powerful motivator for families looking to own a home in the 1950s. This, combined with the redevelopment of downtown Honolulu slum housing in the late 1950s and early 1960s helped to redistribute housing to areas further from downtown Honolulu, including Pearl City where the new residents were typically younger working-class families. Shopping centers and other services (both private and public) opened to serve the emerging community.

The construction of H-1 Freeway in the 1960s increased the opportunity for commuters, and created a surge in demand for housing that stimulated another phase of development. This included high-density housing and franchise retailing operations. In the same period, this development extended eastward along Kamehameha Highway into the adjacent Waiawa and Waimalu areas.<sup>25</sup>

## Part II. Structural/ Design Information:

### A. General Statement:

1. **Character:** Waiawa Bridge exemplifies a multi-span, reinforced-concrete tee-beam<sup>26</sup> bridge constructed in Hawaii during the early 1930s. This 1933 bridge has a parapet design which curves outward at the ends and features narrow arched-top voids. The Waiawa Bridge's approximate total length of 330' has six spans of 54' each. This individual span length is one of the longest in the state for tee-beam bridges and its overall length also places it among Hawaii's longest for this type.
2. **Condition of Fabric:** Good. The bridge has high integrity, with only minor changes --the setting altered, one end stanchion replaced, and guardrails attached to the east stanchions.

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<sup>20</sup> Ann Yoklavich, U.S. Naval Base, Pearl Harbor, Pearl City Peninsula, HABS No. HI-393, 2004. pp. 5-9.

<sup>21</sup> Joyce Chinen, "The Suburbanization of Pearl City," 1994. p. 11.

<sup>22</sup> Ibid.

<sup>23</sup> Ibid.

<sup>24</sup> Ibid., p. 12.

<sup>25</sup> Ibid., p. 13.

<sup>26</sup> National Bridge Inventory Database, Waiawa Bridge, on website [nationalbridges.com](http://nationalbridges.com), accessed May 23, 2012.

## **B. Description:**

The Waiawa Bridge is a reinforced-concrete structure that now carries two lanes of westbound Kamehameha Highway traffic over the gulch formed by Waiawa Stream. The bridge has six spans of about 54' each, to give it a total length of approximately 330'. The width of the asphalt-surfaced bridge is about 34', including 4'-wide shoulders on each side. The three remaining original concrete end stanchions, set slightly farther apart and at an angle to the roadway, are rectangular in plan and elevation. The concrete parapets are 3'-0" high, with a bottom rail measuring 9" high by 1'-4" wide, and a top rail that is 5" high and 1'-0" wide. Between these are 6"-thick concrete panels perforated with narrow arched openings. These openings are spaced at 1'-1½" on center (o.c.), with each measuring 6" wide and 1'-2" high. This parapet design first appeared on Oahu bridges ca. 1930 and appears to have been used during the period between the earlier solid concrete parapets, which were typically in use during the 1920s, and the later parapets with cross-shaped voids that appeared ca. 1936.

Along the length of the parapet, at a spacing of 54'-0" o.c., are stanchions that are the height of the parapet and 2'-6" wide. These stanchions each have a plain 1"-depth inset panel, which is 1'-10" wide and 1'-2" high. A narrow expansion joint vertically bisects each stanchion.

At a point about 6' from the ends of the parapet, at the bridge approaches, the parapets curve gently away from the edge of the roadway, at an arc of about 45 degrees, before meeting the three original end stanchions. The end stanchions are concrete, rectangular in plan, with inset panels on the sides. The end stanchions are 3'-6" wide, 3'-6" high, and 1'-8" thick. The end stanchions have a 9" high base and an 11½" high top cap. A hip-bevel decoration, measuring 3'-0" x 1'-3" and centered on each top cap, rises about 1½" above the cap. Between the base and top cap, the vertical sides of the stanchions are inset about 1½". The three visible sides of the end stanchion (not abutting the parapet) each have an inset pane; the front and back panels are 2'-7" x 1'-2" and the end panel is 10" x 1'-2". The rear and end panels have a hip-bevel ornamentation, and the front panel has either the name of the bridge, or the year of construction inscribed, in 3" high block letters or numbers. The northwest end stanchion is inscribed "WAIAWA". The southwest end stanchion is inscribed "1932" and the northeast end stanchion is inscribed "1933".

The end stanchion and parapet end of the bridge at the southeast corner is different from the other three. This parapet end does not curve away from the roadway. The 3'-0" high concrete end stanchion is curved, about 6' long and 1'-2" thick. This end stanchion has plain vertical surfaces with no inscription, and does not appear to be original. A steel W-beam guardrail is bolted to this end stanchion. The original stanchion at the northeast end also had an attached guardrail. The steel guardrails to the west of the bridge are not attached to the end stanchions on that side.

The underside of the Waiawa Bridge is board-formed concrete, with four longitudinal girders supported by rectangular, reinforced-concrete bents at about 54' spacing. The two legs of each bent are cross-shaped in plan (rabbeted corners), with overall dimensions of 3'-10" x 3'-6".

The horizontal (top) portion of each bent is a reinforced-concrete beam about 5' high with angled corners for support, where it joins the legs. Each bent also has a grade beam with angled corners, tying the bottoms of the two legs together. On the underside of the bridge deck, the longitudinal girders are about 1'-6" thick and approximately 3'-6" high, but their height is greater at the contact points where they meet the bents; the outboard girders are slightly curved at the bents to create spandrels, while the inner girders are simply angled at the points

of support. Joining the girders, above each bent and at two equally spaced planes between bents, are transverse beams with angled-corner connections to the girders.

The bridge abutments are board-formed concrete with angled wing walls of varying length, typically between 20' to 30'. Projecting out about 10" from the abutments, at the level where the longitudinal girders attach, is an engaged transverse beam of board-formed concrete. The girders rest on this beam, which is about 1' high with a beveled bottom surface.

### **C. Site Information:**

The Waiawa Bridge is located along a section of Kamehameha Highway about  $\frac{5}{8}$  mile east of its junction with Farrington Highway. (Some maps incorrectly label this road segment as part of Farrington Highway.) In Hawaii roads are not given Tax Map Key (TMK) designations. This bridge lies just north of TMK 9-6-003: 022. The setting around the bridge has changed greatly since 1933, when the surrounding land was almost entirely planted in sugarcane (see 1939 aerial photo in this report). However, vegetation in Waiawa gulch screens some of the modern changes from view and provides a rural impression to travelers on the bridge. Without the screening vegetation immediately around the bridge the urban character of the surrounding area would be evident. South of the bridge and north of the 1950s added lanes for eastbound Kamehameha Highway traffic is the Hawaii Laborers' Training Center. Further south is the H-1 freeway and Leeward Community College. North and east are large commercial and retail complexes as well as a pair of high-rise residential towers. To the west is the large interchange of the H-1 and H-2 Freeway junction.

## **Part III. Sources of Information:**

### **A. Primary Sources:**

#### **Architectural Drawings and Early Views**

Original drawings of the Waiawa Bridge are electronic files (scans) provided by the Hawaii DOT, Highways Division, Design Branch for use in this report: Project No. E-9-B, Kamehameha Highway, dated March 1932. These drawings were created by the Territorial Highway Department and are considered in the public domain.

Historic maps and aerial photos are located in the collections of the Hawaii State Archives. The maps were made by the U.S. Geological Survey and the U.S. Army Corps of Engineers and are in the public domain. The aerial photo used in this report was created by the U.S. Army Air Corps and is in the public domain.

### **B. Secondary Sources:**

Chiddix, Jim, and MacKinnon Simpson. *Next Stop Honolulu, Oahu Railway & Land Company 1889-1971*. Honolulu: Sugar Cane Press. 2004.

Chinen, Joyce. "The Suburbanization of Pearl City," *The Pearl City Local History Project*. Pearl City: Cultural Heritage Learning Center. 1994.

Heritage Center, School of Architecture, University of Hawaii at Manoa. State of Hawaii, Historic Bridge Inventory and Evaluation. Draft prepared for the State of Hawaii, Department of Transportation, Highways Division. May 2008.

MacDonald, Thomas H. "Highway Administration in the United States," *Good Roads*. November 1925. pp. 275-277.

National Bridge Inventory Database. Waiawa Bridge, on website [nationalbridges.com](http://nationalbridges.com), accessed May 23, 2012.

Nellist, George F. *The Story of Hawaii and Its Builders, with which is Incorporated Volume III, Men of Hawaii*. Honolulu: Honolulu Star-Bulletin, Ltd. 1925.

\_\_\_\_\_. *Men of Hawaii, Volume IV*. Honolulu: Honolulu Star-Bulletin, Ltd. 1930.

Parsons Brinckerhoff and Engineering and Industrial Heritage. A Context for Historic Bridge Types, NCHRP Project 25-25, Task 15. Prepared for the National Cooperative Highway Research Program. October 2005.

Superintendent of Public Works. *Report to the Governor, Territory of Hawaii for the Year Ending June 30, 1932 (and 1933)*. Honolulu: Advertiser Publishing Co., Ltd. 1933 and 1934.

Territorial Highway Department, Hawaii Highway Planning Survey. Bridge Inventory for the Island of Oahu. Prepared in Cooperation with the U.S. Department of Commerce, Bureau of Public Roads. September 1950.

Thompson, Bethany. Historic Bridge Inventory, Island Of Oahu. Prepared for the State of Hawaii, Department of Transportation, Highways Division. June 1983.

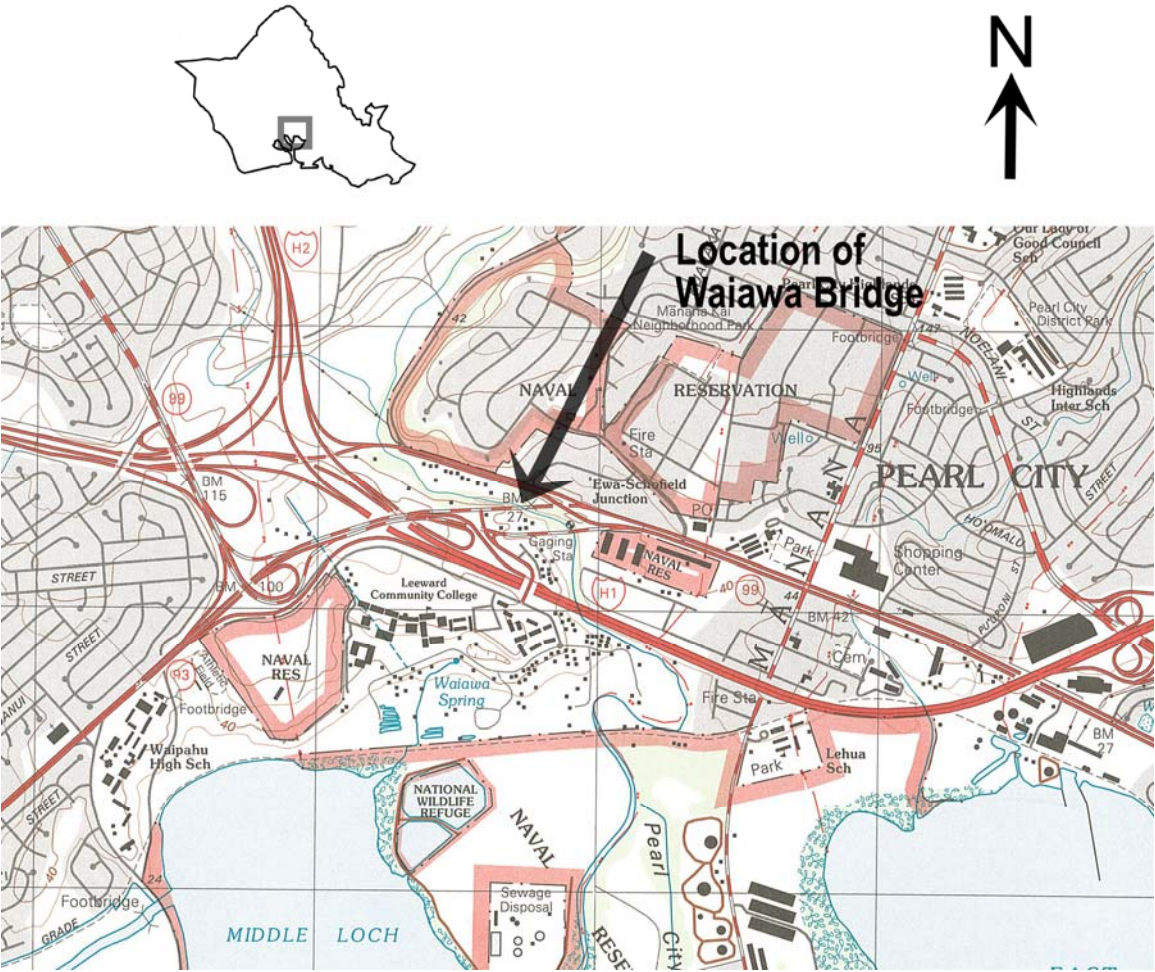
"Trease: A Roadmap in His Head," *Honolulu Advertiser*, July 12, 1964, article at the University of Hawaii, Hamilton Library, Honolulu Newspapers Clippings Morgue, on microfiche in Biographical section under: Trease, Merritt and Esther.

Yoklavich, Ann. Historic American Buildings Survey (HABS), U.S. Naval Base, Pearl Harbor, Pearl City Peninsula, HABS No. HI-393. Submitted to National Park Service, U.S. Department of the Interior. 2004.

### **C. Likely Sources Not Yet Investigated:**

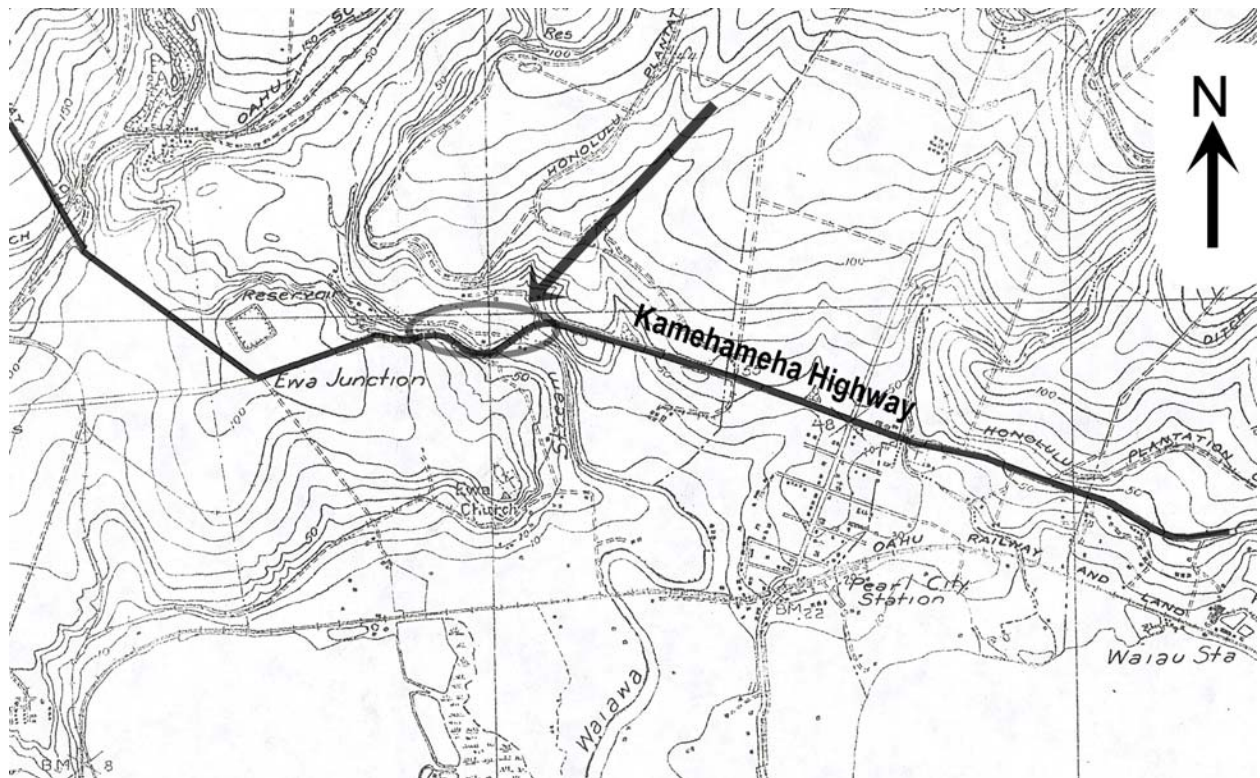
National Archives and Records Administration files for the U.S. Department of Transportation, Federal Highways Administration and for predecessor agencies such as U.S. Department of Commerce, Bureau of Public Roads.

Location Map



WAIAWA BRIDGE  
(Waiawa Bridge Westbound)  
HAER No. HI-101 (Page 11)

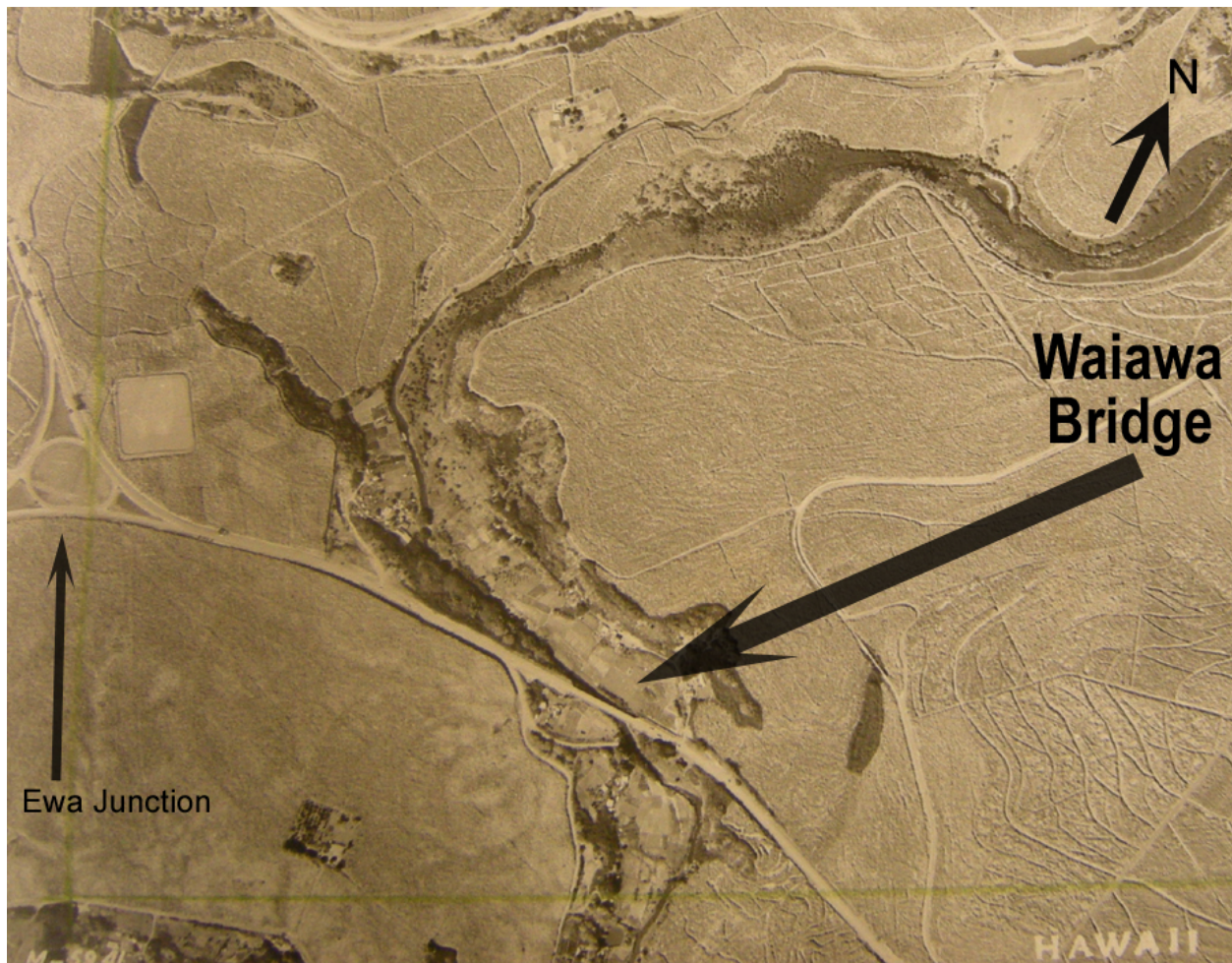
Portion of topographic map from 1927 showing the future location of the Waiawa Bridge (added arrow and oval highlight, as well as "Kamehameha Highway" label). *U.S. Geological Survey, Waipahu Quadrangle, 1:20,000, 1927.*





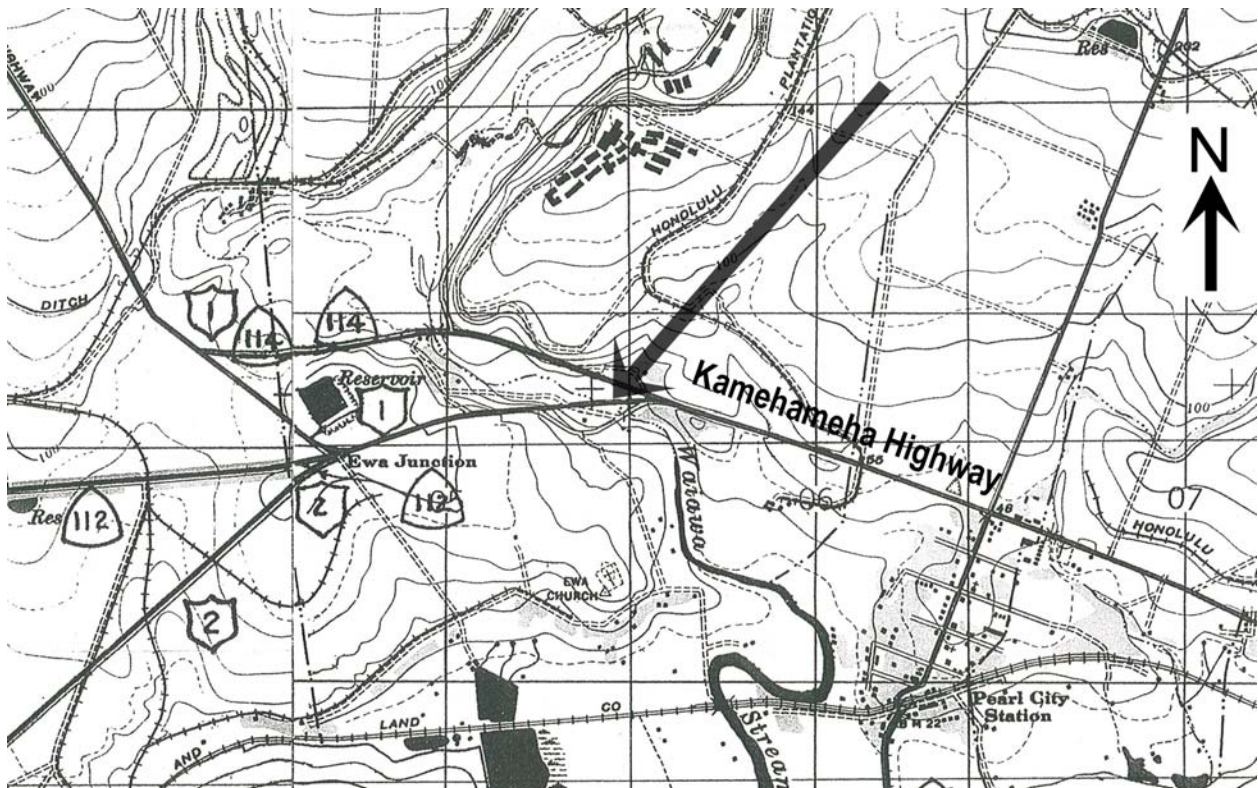
WAIAWA BRIDGE  
(Waiawa Bridge Westbound)  
HAER No. HI-101 (Page 12)

Portion of aerial photo ca. 1939 showing the Waiawa Bridge on Kamehameha Highway east of Ewa Junction (added arrows and lettering). Note the curve of the former highway alignment south of the bridge and the circle at Ewa Junction. *Hawaii State Archives, Folder PPA-59-2, photo M-58.41 (public domain). U.S. Army Air Corps, 1939-41.*



WAIAWA BRIDGE  
(Waiawa Bridge Westbound)  
HAER No. HI-101 (Page 13)

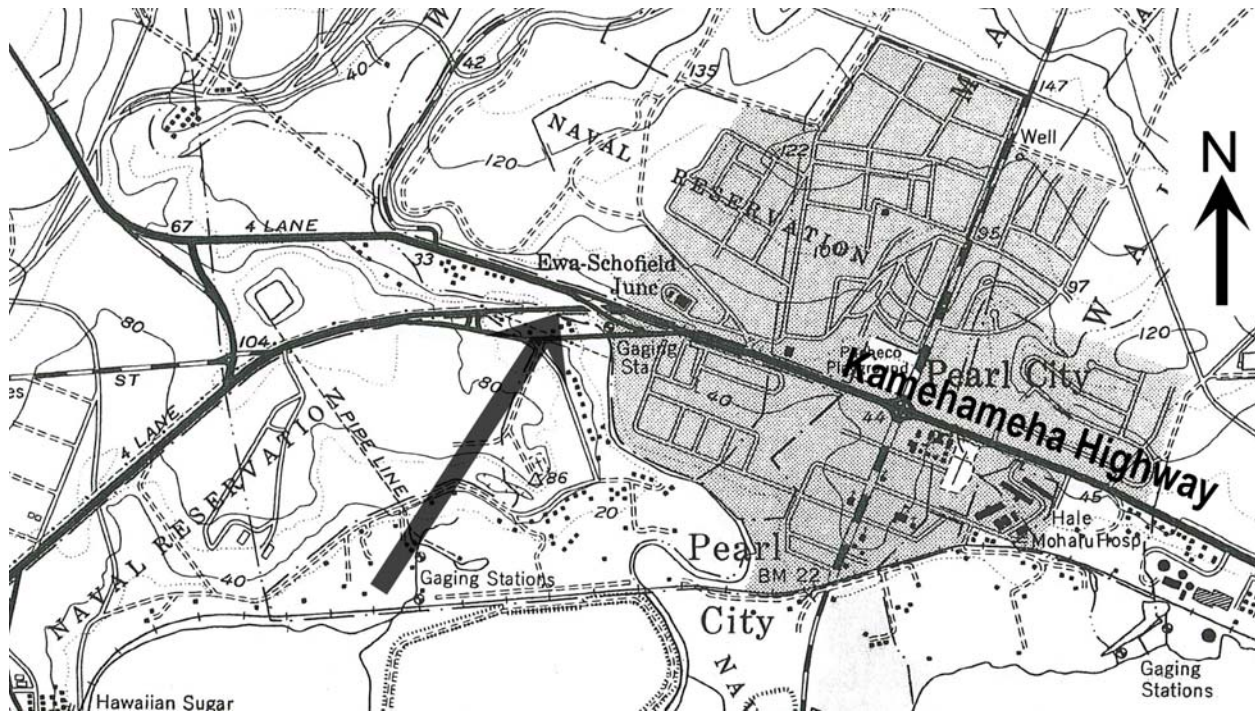
Portion of 1943 topographic map showing the location of the Waiawa Bridge (added arrow and "Kamehameha Highway" label). Note the straightening of the highway at the 1933 bridge and the 1940 Waiawa Cutoff road to the north that allowed some traffic to bypass Ewa Junction. Also note that the map does not show Ewa Junction as a circle. *U.S. Army Corps of Engineers, Waipahu Quadrangle, 1:20,000, 1943.*



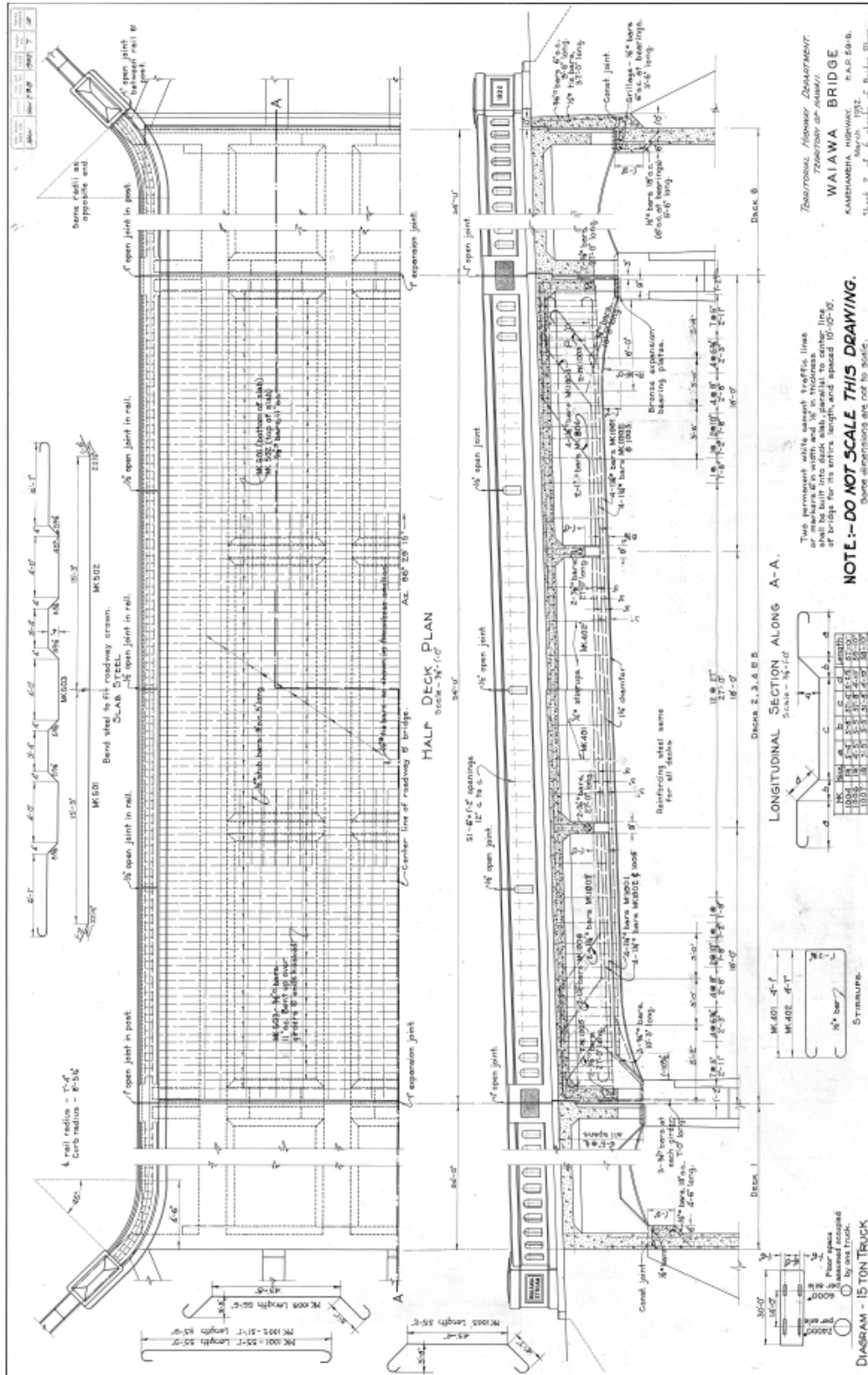


WAIAWA BRIDGE  
(Waiawa Bridge Westbound)  
HAER No. HI-101 (Page 14)

Portion of 1954 topographic map showing the Waiawa Bridge (added arrow and "Kamehameha Highway" label). Note the highway construction to the south of the bridge that provided separate lanes for eastbound traffic, and the overpass just east of the bridge that allowed eastbound Waiawa Cutoff traffic to travel onto Kamehameha Highway without an intersection. U.S. Geological Survey, Waipahu Quadrangle, 1:24,000, 1954.



**Half Deck Plan and Longitudinal Section of Waiawa Bridge.** Territorial Highway Department, Territory of Hawaii, March 1932 (public domain).



**HISTORIC AMERICAN ENGINEERING RECORD  
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**HAER No. HI-101-1**



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**HAER No. HI-101-2**





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**HAER No. HI-101-3**



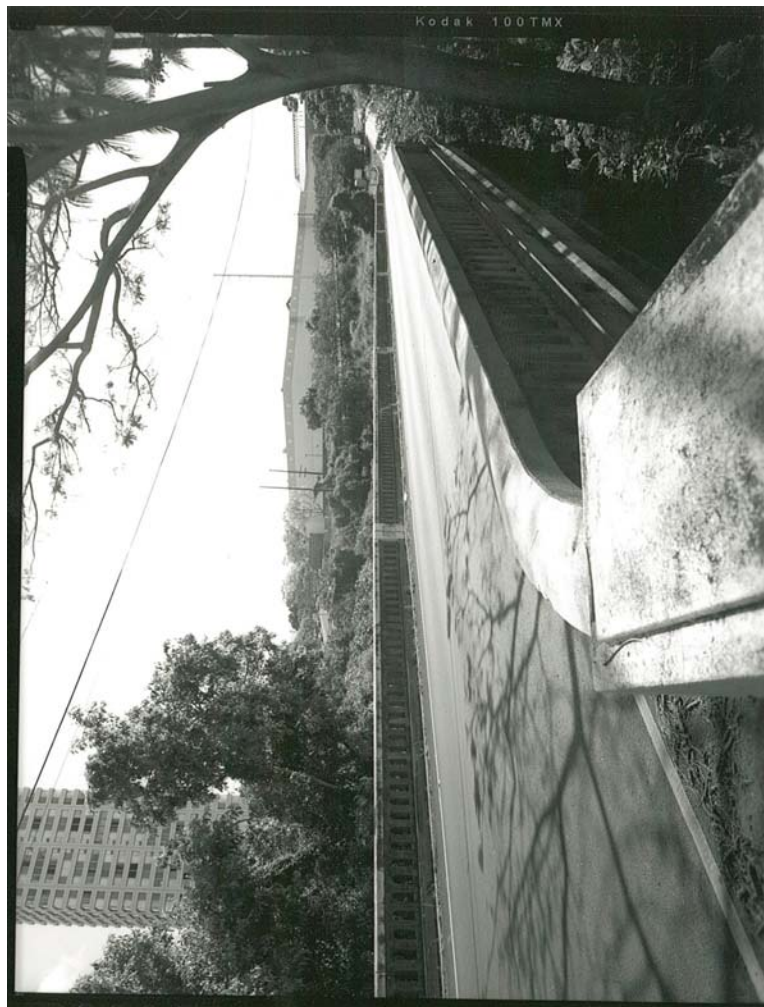
**HISTORIC AMERICAN ENGINEERING RECORD  
SEE INDEX TO PHOTOGRAPHS FOR CAPTIONS**

**HAER No. HI-101-4**



**HISTORIC AMERICAN ENGINEERING RECORD  
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**HAER No. HI-101-5**



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HAER No. HI-101-6





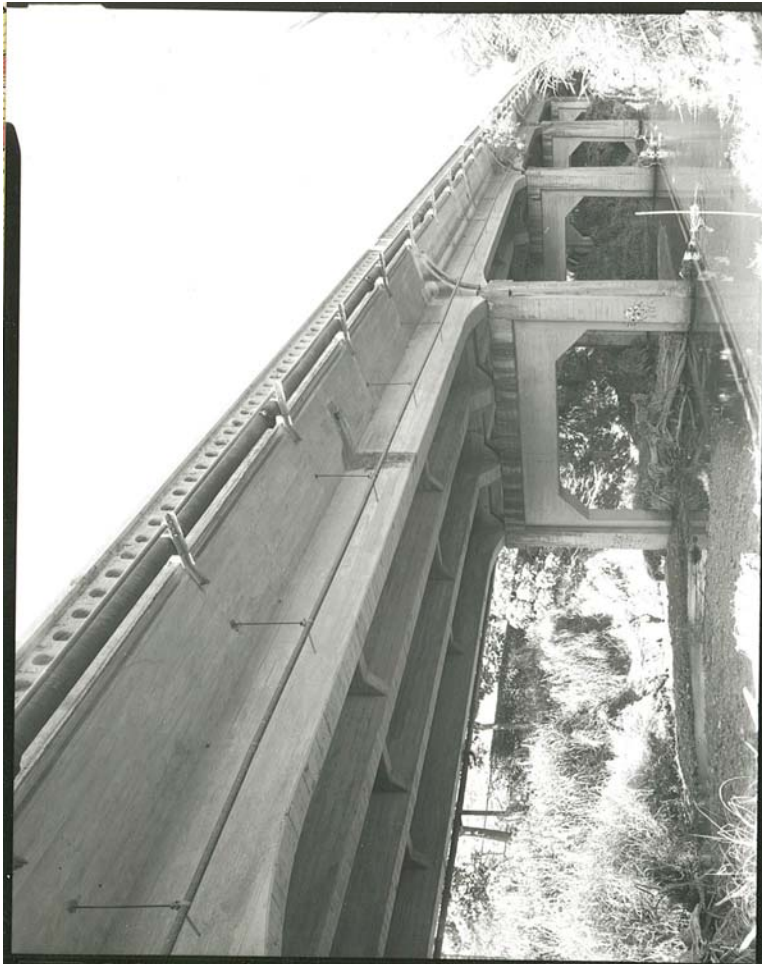
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**HAER No. HI-101-7**



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**HAER No. HI-101-8**



**HISTORIC AMERICAN ENGINEERING RECORD  
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**HAER No. HI-101-9**

